

## REMARKS

Claims 1-17 and 22-29 are pending in the application.

Claims 1, 17, 26 and 28 are amended above to further distinguish the claimed invention from the cited prior art.

New claim 29 has been added to the application.

### I. THE CLAIM AMENDMENTS

Claims 1 and 26 are amended above to more clearly define how elements of the claimed vehicle arresting device operate together to arrest the movement of the vehicle. In particular, these claims are amended to specify that, in use, the net lies flat on the ground and to require the spikes be attached to the net leading portion such that when a vehicle runs over the leading portion, one or more of the spikes becomes embedded in a tire, the net become wrapped around the front wheels of the vehicle and the portion of the net between those wheels is pulled tight under the vehicle to prevent further rotation of the front wheels.

### II. THE OBVIOUSNESS REJECTION

The examiner finally rejected claims 1-8, 10-12, 17, 23 and 26-28 for obviousness over Ousterhout et al (USP 6,312,188) in view of Horton et al (USP 6,409,420) and in the case of claims 2-5 further in view of Marphetia (USP 6,312,189). In particular, it is the examiner's position that Ousterhout discloses a vehicle arresting device (110) including a net (120) adapted to be laid flat on the ground in the path of a vehicle. The examiner admits that Ousterhout fails to disclose the use of tire puncturing spikes mounted to the net. The examiner relies upon Horton to provide the missing features explaining that Horton discloses vehicle capture nets with tire puncturing spikes at least at a leading edge of the net. The examiner's obviousness rejection is overcome *inter alia* by amending independent claims 1 and 26 above to address the examiner's remarks concerning the previous "adapted to be laid flat" language and to emphasize the manner in which the invention functions to arrest a vehicle. Claim 1 has also been amended to specify that the claimed net loop orientation applies when it is laid flat on the ground in the path of a vehicle to be arrested. Moreover, the Applicant is providing secondary evidence of non-obviousness in the form of a brochure that establishes the claimed invention fulfills a long felt

need in the art.

**A. The Amended Claims Are Patentable**

Independent claim 1 as amended above is patentable over the Ousterhout reference alone or when combined with the Horton reference. It should be pointed out initially that the Ousterhout apparatus works by a completely different method than the claimed apparatus. Nets 20 or 120 of Ousterhout are deployed in an upright orientation between telescopic supports. The upright net is placed in the path of a target vehicle and the net surrounds the front of the vehicle as it drives into and past the barrier. The vehicle is brought to a halt by brake systems 24 or 124A, 124B attached to the net through cables, all as described with reference to Figures 7-11 and 15-19 of the reference. Thus, the Ousterhout net is not laid flat on the ground as claimed, is not equipped with spikes that become embedded in the vehicle's tires nor does it wrap around the wheels and pull tight under the vehicle to stop the wheels turning which is how the device of the present invention is claimed to function.

A further significant feature of the amended claim 1 is that the loops of the net are oriented with a longer dimension in the fore and aft direction than in the transverse direction of the device when laid flat on the ground in the path of a vehicle to be arrested, whereby any widthwise portion of the net is capable of substantial transverse elongation. This helps to ensure that the net has sufficient lateral stretch to absorb the loads that are imposed on it as it pulls tight to arrest a vehicle, and to allow the net to become sufficiently wrapped around the front wheels before the tension builds up to a level at which there might otherwise be a risk of the spikes being pulled from the tires. This does not feature in the Ousterhout device, which is never laid flat on the ground in use. Furthermore transverse elongation of the net is not addressed at all in Ousterhout, due no doubt to the completely different way in which it functions to capture a vehicle, rather than wrapping around the front wheels and pulling tight under the vehicle.

The teachings of Horton do not provide the features missing from Ousterhout. For example, Horton does not disclose a net that becomes wrapped around the front wheels of the vehicle and where the portion of the net between the front wheels of the vehicle is pulled tight under the vehicle preventing further rotation of those wheels. Instead, the Horton net is used to stop vehicle motion by other means. In one means shown in Figures 1-6, two sets of net spikes become embedded in the front and rear tires and the winding of the net around both the front and

rear wheels links those wheels together and halts further movement. A similar means is depicted in Figures 8-11. These also require the trailing portion of the net to be folded over, e.g. as indicated at 55 and 155 in the reference, and the use of a complex computer-controlled system to jettison dome shaped covers 62 for the spikes using compressed air, none of which is required by the present invention. An alternative means is shown in Figures 12-15 where a pipe-like rigid member is attached across the width of the trailing edge of the net and engages under the vehicle frame. It is clear, therefore, that Horton does not disclose a net including the features of the amended claim 1 that operates as recited therein.

Neither does Horton disclose the characteristic net loop orientation of claim 1. On the contrary it is clear from the perspective views of Figures 1, 7 and 12 of the reference that the loops of the net are in fact square, with no longer dimension in the fore and aft direction than in the transverse direction as claimed. Furthermore transverse elongation of the net is not addressed at all in Horton. This is not taught as a factor in effecting an arrest in the reference due to the different ways than the invention in which the Horton devices function as described above.

For all of these reasons it is clear that no combination of Ousterhout and Horton can render the amended claim 1 obvious, nor any of claims 2-8, 10-12, 17 or 23 which are all directly or indirectly appended to claim 1.

Independent claim 26 as amended above is also patentable over any combination of Ousterhout and Horton. Firstly this is for the same reason as discussed above for claim 1 that neither reference teaches a method of arresting a vehicle where a net laid flat on the ground becomes wrapped around the front wheels of the vehicle and where the portion of the net between the front wheels of the vehicle is pulled tight under the vehicle preventing further rotation of those wheels. Furthermore this claim requires that spike assemblies are attached to the net by penetrating the net with the spikes and that the material of the net encircles respective spike shaft portions. This is not how the spikes are attached to the net in Horton, however. The relationship of the net to a typical spike is shown in Figure 3 of Horton from which it is seen that the spike 52 does not penetrate the material of the net (cable 26) at all. Rather, the spike is mounted on a base 58 which is shown affixed to the net system by the cable 26 passing through a bore on the base. Compare this to Figure 8 of the present application where the net knot 1A is shown encircling the spike shaft 12 in accordance with claim 26.

For the same reasons no combination of the references can render obvious either of claims 27 or 28 which are appended to claim 26.

**B. Combining The References Does Not Lead To The Claimed Invention**

All pending claims are non-obvious because combining the references as the examiner has does not result in the claimed invention. It is the examiner's position that it would have been obvious to one of ordinary skill in the art to provide the vehicle arresting device of Ousterhout with tire puncturing spikes as taught by Horton in order to facilitate the immobilization of vehicles being arrested. The examiner's combination is faulty for several reasons. Firstly, Ousterhout already discloses the use of tire spikes 32 associated with barrier enclosure 26. Tire spikes 32 are intended to puncture the tire of a vehicle passing over barrier enclosure 26. It is notable that spikes 32 are not associated with the Ousterhout net. Therefore, one skilled in the art at the time of the invention upon considering Ousterhout would not change the location of spikes 32 in any manner because they are already optimally positioned for the manner in which Ousterhout intends them to work.

Moreover, even if spikes were applied to the Ousterhout net in a manner as described in Horton, the modified net would not operate to arrest the motion of vehicles in the manner that is presently claimed. Instead, the net would operate substantially as set forth in Ousterhout – it would remain in a vertical position and it would retard the forward motion of a vehicle in that position. The spikes would extend horizontally from the vertical net, not upwardly as claimed, and there would be no wrapping of the net around the vehicle tires as claimed.

Finally, one skilled in the art at the time of the invention would not have combined Ousterhout with Horton as the examiner has because the references relate to apparatuses for retarding the forward motion of vehicles by entirely different methods. The Ousterhout reference describes a vehicle restraining device that is designed to operate when a vehicle runs into it – the net envelops the front of the vehicle much like a baseball glove is used to envelop a baseball to retard its forward motion. Horton, on the other hand, is directed to a retarding device that is placed flat on the ground in order to allow a vehicle to run over the device in order to initiate the process of retarding the vehicle motion. Clearly, the two devices operate in entirely different manners, they require different elements and one skilled in the art at the time of the invention

would not have considered modifying the Ousterhout device with features of the Horton device because of their dramatically different operations.

### **C. Rebuttal Of The Examiner's Final Obviousness Rejection**

The examiner raises several positions in the October 16, 2007 Advisory Action that are addressed below.

Firstly the examiner's remarks concerning whether the net of Ousterhout is "adapted to be laid flat on the ground" are moot in view of the positive recitation in all applicable independent claims now presented that the net "in use, lies flat on the ground".

Secondly, the examiner's position that multiple capture lines (152) are illustrated in Ousterhout wrapping around the vehicle wheels and are components of the net is clearly incorrect based upon the Ousterhout disclosure and based upon how a person of skill in the art would understand Ousterhout. This capture line is mentioned repeatedly throughout the description from column 8, line 47 to column 10, line 56 and always in the singular. Its purpose is to engage around the rear of the vehicle and prevent it *reversing* away from the barrier once captured in the net 120, not to wrap around the front wheels as claimed. Figures 22 and 23 show this single line in successive positions in accordance with conventional drawing practice and as emphasised by the arrows 300 and 302. Note also the description of these Figures in column 3, lines 39-42:-

"Figs 20-23 illustrate... the interaction of *a capture line* of the device... *during various stages of capture*"

Furthermore this single line isn't even part of the net – see column 8, lines 47-48:-

"The aft capture line 152 is, advantageously, not secured along its length to the lower portion 156 of the barrier 120".

Therefore, the applicant reiterates their position that Ousterhout does not show a "net" wrapping around vehicles wheels.

The examiner next states in the Advisory Action that "it is quite obvious that the addition of tire piercing spikes to the net [of Ousterhout] as taught by Horton would in fact promote or otherwise cause the net to wrap around the wheels of vehicles with high ground clearance such as cargo trucks". As noted above, Ousterhout is intended to be operated such that the net envelops

the front end of the vehicle “forming a pocket around the front end of the vehicle”. (Column 14, lines 38-42). Indeed, Ousterhout expressly teaches away from placing the net in a position where it would end up under the vehicle when it states in reference to Figure 33 that “this lack of direct securing of the numbers 760 and 762 to each other .... allows the front tires of the vehicles to roll through the barrier to avoid damage to the net which might occur if the barrier [net] were to be trapped between the tires and the ground”. (Column 14, lines 38-45). One skilled in the art at the time of the invention would understand this excerpt of Ousterhout to disclose a net that is not intended to be trapped between the vehicle tires and the ground in order to avoid damage to the net. Thus, the examiner’s allegation that it would be obvious to apply spikes to the Ousterhout net is again contrary to the express teachings of Ousterhout as understood by one skilled in the art at the time of the invention. Moreover, the cargo truck scenario is clearly created by the examiner in hindsight with the Applicant’s invention in mind.

In relation to the examiner’s position on claim 26 reference is directed to the applicant’s remarks in relation to that claim (as amended) in Section A above.

#### **D. The Claimed Invention Has Met With Commercial Success**

Attached to this Reply at Appendix A is a marketing brochure prepared by the Applicant that describes the development and testing and use of the claimed device. As an initial matter, the brochure notes that the claimed invention fulfills a need for a vehicle arresting system that is light to carry, easy to deploy and quickly and safely stops vehicles in a non-lethal manner. The brochure indicates that 2000 units of the device have been sold to the United States Army alone and over 4000 units are in service across the world. It also includes an endorsement from a representative of the Armaments Engineering and Technology Center of the US Army. The brochure, therefore demonstrates both that claimed device has fulfilled a long felt need and that it has met with commercial success. It is believed, therefore, that the attached brochure provides secondary evidence of the non-obviousness of the claimed invention.

### **III. NEW CLAIM 29**

New claim 29 is directed to a vehicle arresting device that encompasses a flexible substrate where the flexible substrate includes many of the features of claims 1 and 26. New

claim 29 is non-obvious and patentable over Ousterhout and Horton for the same reasons recited in Section II above.

#### **IV. THE ALLOWABLE SUBJECT MATTER**

The applicant acknowledges that claims 13-16, 22, and 24-25 stand allowed and that claim 9 stands objected to for depending upon a rejected base claims.

#### **CONCLUSION**

Pending application claims 1-17 and 22-29 are believed to be patentable for the reasons recited above. Favorable reconsideration and allowance of all pending application claims is, therefore, courteously solicited.

Date: January 21, 2009

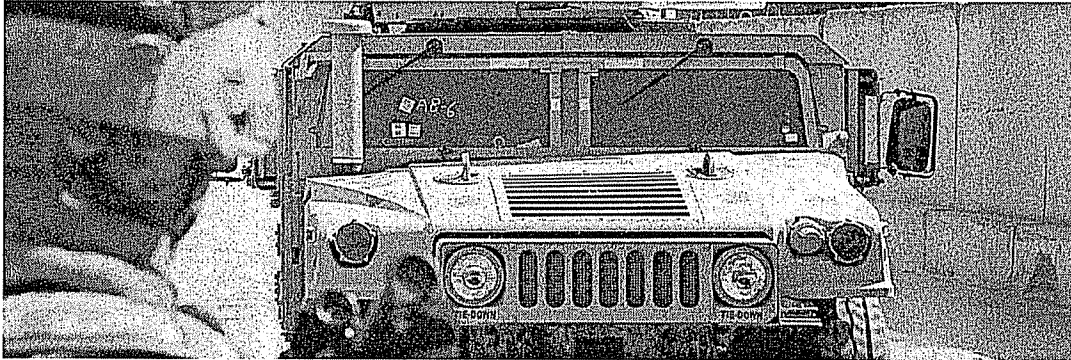
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## **Appendix A**



## Case Study – X-Net®

### US Army deploys QinetiQ vehicle arrest system in Iraq and Afghanistan



*Courtesy: Department of Defense*

"We needed a system capable of stopping a vehicle weighing up to 5,500 lb travelling at speeds up to 30 mph within 200 feet and non-lethality was a primary requirement. X-Net® successfully passed this and other rigorous tests to prove that it is capable of being successfully deployed in a military environment."

**Linda Chico, NLCS System Engineer for Advanced Energy Armaments Systems, Armaments Engineering and Technology Center, US Army**

From combat zone checkpoints to highway blockades, there are many instances when vehicles need to be quickly brought to a halt without harming the occupants or others nearby.

Vehicle arrest has always been a serious challenge for military and police agencies. To meet that challenge, QinetiQ, a leading international defence and security technology business, has now produced a vehicle arrest system that is so effective that it has been successfully deployed by the US Army in both Iraq and Afghanistan and over 4,000 units are in service across the world.

X-Net® is a unique spiked net made of Dyneema®, a highly refined super-strong polyethylene fibre. Spikes in the leading edge of the net pierce the front

tyres and the net then envelopes them, bringing the vehicle to a safe and controlled stop in seconds with minimal collateral damage. Weighing just 28lb, X-Net® is designed to stop vehicles up to two tonnes and its larger version TruX-Net™ vehicles up to 20 tonnes.

It is more effective than alternative solutions such as spike strips that puncture tyres, and electronic engine disruption that cannot be effective for every vehicle with different types of engine management systems.

#### **Saving lives**

"The product is designed to determine intent and it has saved lives," explains Phil Dandy, QinetiQ's Business Development Manager for X-Net®. "It provides a non-lethal solution to stop vehicles at checkpoints that have failed to halt voluntarily."

#### **Challenge**

- The US Army required a vehicle arrest system that was light to carry, easy to deploy and would quickly and safely stop vehicles in a non-lethal manner.

#### **Solution**

- The Army has so far purchased 2,000 of QinetiQ's X-Net® non-lethal vehicle arrest systems.
- Spikes in the leading edge of the net pierce the front tyres, the net then envelopes them bringing the vehicle to a safe and controlled stop in seconds with minimal collateral damage.
- Weighing just 28lb, X-Net® is designed to stop vehicles up to two tonnes and its larger version TruX-Net™ will arrest vehicles up to 20 tonnes.
- A remote deployment solution, X-Tend™ will winch X-Net® across the road in 1.5 seconds.

#### **Results**

- Known as M2 Vehicle Lightweight Arresting Device (VLAD) by the Army, X-Net® is now an integral part of its Non-Lethal Capabilities Set which are collections of equipment sent to combat units.
- As part of the Hasty Checkpoint module it is currently being used in support of Operation Iraqi Freedom and Operation Enduring Freedom in Afghanistan.

The US Army is the major customer for X-Net® having, to date, purchased some 2,000 units.

"A previous system we used was a semi-permanent barrier and, from feedback, we learned that it was too big and bulky to be moved around and deployed quickly," explains Linda Chico, NLCS System Engineer for Advanced Energy Armaments Systems in the US Army. "We needed a more field expedient way to create hasty 'snap' checkpoints that could be carried by one individual and non-lethality was a primary requirement.

#### Stringent tests

"Following a demonstration of X-Net® in the UK, we initiated a rigorous qualification test programme to ensure that it could withstand a military environment and X-Net® passed.

"The nomenclature we use for X-Net® is M2 Vehicle Lightweight Arresting Device (VLAD) and it is now part of the US Army's Non-Lethal Capabilities Set which is a series of equipment sets that are delivered to army units to support different mission models.

"VLAD is part of the Hasty Checkpoint pack and is currently being used in support of Operation Iraqi Freedom and Operation Enduring Freedom in Afghanistan."

#### Deployment options

Speed of deployment is one of X-Net's® major assets and QinetiQ is now working on new deployment solutions.

"Funded by the Joint Non-Lethal Weapons Directorate (JNLWD), we have already developed X-Tend™, a remote deployment system that winches X-Net® across the road in 1.5 seconds and is triggered by a foot pedal, keeping soldiers out of harm's way and leaving their hands free to hold weapons," adds Dandy.

#### Why QinetiQ?

- QinetiQ had a strong track record of working on vehicle arrest systems, originally prompted by anti-terrorist activities in Northern Ireland.
- It was aware of the specific military and police requirements through its early work with the UK Ministry of Defence.
- The X-Net® development team has a wide and impressive skill-set backed by an ability to pull in additional expertise from across the QinetiQ organisation.

**Customer Name:** US Army  
Armaments Engineering and  
Technology Center  
**Industry sector:** Defence  
**Headquarters:** Picatinny,  
New Jersey, USA  
**URL:** [www.army.mil](http://www.army.mil)



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